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DOI: https://doi.org/10.1016/j.rfe.2014.08.003

Socially Responsible Investing and Stock Performance: New Empirical Evidence for the US and European Stock Markets

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Abstract

This paper empirically examines the theoretically ambivalent relationship between socially responsible investing (SRI) and stock performance. It contributes to the existing literature by considering both the US and the entire European stock markets and by using consistent world-wide corporate sustainability performance data. Our portfolio analysis from 1998 to 2009 is based on the common four-factor model according to Carhart (1997), which comprises market return, size, value, and momentum factors. We show for the US and the European stock markets that SRI is associated with large-sized firms. The main result of our paper are the insignificant abnormal stock returns for SRI in both regions. Therefore, our study supports the view that SRI stocks are correctly priced by market participants, although we cannot rule out that a corresponding mispricing has existed before the beginning of our observation period in 1998.

Keywords: Socially responsible investing (SRI), stock performance, portfolio analysis, asset pricing models, risk factors
JEL: G11, G12, Q56, M14

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Acknowledgment: We would like to thank the participants of the Annual Conference 2012 of the European Association of Environmental and Resource Economists (EAERE) in Prague and the Annual Congress 2012 of the Verein für Socialpolitik in Göttingen for their helpful comments. Our special thanks go to Peter Steffen Schmidt for through discussions as well as to the Zurich Cantonal Bank (ZKB) for infrastructural, financial, and data support, in particular René Nicolodi and his team. Financial support from the Swiss National Science Foundation (SNF) and from the Commission for Technology and Innovation of the Swiss Confederation (CTI) is gratefully acknowledged.

1 Introduction

Growing individual awareness of environmental, social, and ethical issues is strongly affecting purchase decisions of market participants, for example, with respect to certified green or fair-trade products (Kitzmueller and Shimshack, 2012). This development is fueling private and institutional investment decisions towards socially responsible investing (SRI), also labeled ethical or sustainable investing (Renneboog et al., 2008). This investment strategy consists of choosing stocks on the basis of environmental, social, and ethical screens (Barnett and Salomon, 2006). SRI has experienced strong growth around the world. Figure 1 reports that according to Eurosif (2008, 2010, 2012), core SRI in Europe grew from 34 billion € in 2002 to 2630 billion € in 2011. For the US, the Forum for Sustainable and Responsible Investment reports that one out of eight invested US dollars (USD) follows SRI guidelines. According to Figure 1, the assets under management following SRI screening increased from from 166 billion USD in 1995 to 3314 billion USD in 2011 (US SIF, 2012). While these data for the US and Europe should not be compared directly due to different SRI categorization schemes, they reveal the increasing popularity of SRI.

The growth in the volume SRI assets has attracted academic interest so that several empirical studies examine the relationship between environmental, social, or ethical investments and stock performance. Methodologically, these studies use common micro-econometric approaches (Filbeck and Gorman, 2004; Ziegler et al., 2007), the short-term event study approach (Cañón-de Francia and Garcés-Ayerbe, 2009; Capelle-Blancard and Laguna, 2010; Deng et al., 2013; Fisher-Vanden and Thorburn, 2011; Krueger, 2014; Oberndorfer et al., 2013; Teoh et al., 1999), or portfolio analyses (Bebchuk et al., 2013; Eccles et al., 2013; Edmans, 2011; Hong and Kacperczyk, 2009). Most studies in this field are based on the third approach by directly considering the investor perspective, i.e. by comparing the stock performance of SRI funds or portfolios with the stock performance of conventional funds or portfolios.

One direction of such portfolio analyses examines the performance of sustainability stock indexes (Bauer et al., 2005; Sauer, 1997; Schröder, 2007), such as the Domini 400 Social Index. These stock indexes like the Dow Jones Sustainability Index family (Ziegler, 2012; Ziegler and Schröder, 2010) constitute the basis for some socially responsible mutual funds. A second group of portfolio analyses compares the risk-adjusted stock returns of socially responsible funds with the corresponding risk-adjusted stock returns of conventional mutual funds (Bauer et al., 2007, 2005; Capelle-Blancard and Monjon, 2013). However, studies on actively managed mutual funds have the drawback that the financial performance is affected by SRI and the ability of the fund managers. This problem is addressed by a third group of portfolio analyses, building on synthetic SRI portfolios based on corporate sustainability performance assessments, for example, provided by Innovest

(Derwall et al., 2005) or KLD Research & Analytics (Borgers et al., 2013; Derwall et al., 2011; Kempf and Osthoff, 2007). Some of these assessments are the basis for popular sustainability stock indexes, such as the Domini 400 Social Index that is constructed with KLD ratings.

Theoretically, the relationship between SRI and stock performance is ambivalent. The following three hypotheses are discussed in the literature (Bauer et al., 2005; Hamilton et al., 1993): First, if socially responsible investors increase stock prices of firms with a high sustainability performance over their fundamental value, SRI stocks are overpriced and thus have lower expected returns than conventional stocks. The second hypothesis is that the expected returns of SRI stocks are higher than those of their conventional counterparts if a high corporate sustainability performance is related to a higher corporate economic performance without recognition by investors, implying underpriced SRI stocks. Finally, the third hypothesis states that SRI stocks are not mispriced since corporate sustainability performance or corporate social responsibility (CSR), referring to corresponding corporate environmental, social, and ethical activities, is correctly priced by the stock market. This third argument reflects the traditional finance view because in the presence of efficient capital markets and elastic demand curves, SRI cannot influence the cost of firm capital (Wall, 1995).

The first hypothesis is in line with the extension of the Capital Asset Pricing Model (CAPM) by Merton (1987). According to the CAPM, the optimal risk-return stock portfolio for mean-variance investors is the market portfolio. As a consequence, portfolios deviating from the market portfolio are not optimally diversified. However, if the CAPM is extended by asymmetric information according to Merton (1987), segmented markets are created in which stock prices are affected by the combination of different investor bases and imperfect diversification. Therefore, SRI stocks can be overpriced due to a broader investor base. Hong and Kacperczyk (2009) apply this reasoning to the opposite of SRI stocks, namely to sin stocks, that are shunned by many investors because they are involved in alcohol, tobacco, or gambling industries. In the presence of limited arbitrage these stocks should have higher expected returns than stocks from other sectors because of limited risk sharing in combination with possibly higher litigation risks. Hong and Kacperczyk (2009) indeed find positive abnormal stock returns for sin portfolios for very long time periods in different markets. In contrast, the studies of Eccles et al. (2013) and Edmans (2011) report positive abnormal returns for SRI stocks in the US, which is in line with the second hypothesis. Eccles et al. (2013) analyze firms with sustainable practices in 1993 over the time period 1993 to 2009. They show that these firms follow different practices and have a different investor base and thus have a higher stock performance than their counterparts with a lower sustainability performance. Edmans (2011) reveals positive abnormal returns between 1984 and 2005 for a portfolio of the "100 Best Companies to Work For in America" and concludes that certain SRI screens may increase stock

returns.

With respect to the third hypothesis in relation to the second hypothesis, two recent studies by Bebchuk et al. (2013) and Borgers et al. (2013) find for the US that errors in expectations of investors associated with corporate sustainability performance indeed existed in the past, but that the corresponding mispricing of SRI stocks disappeared over time due to gradual learning of market participants. Bebchuk et al. (2013) report positive abnormal stock returns for SRI portfolios from 1990 to 1999, but show that these become insignificant between 2000 and 2008 since the market participants learned to differentiate between poorly and well governed firms during the 1990s and payed more attention to governance issues in the 2000s. Similarly, Borgers et al. (2013) consider SRI portfolios on the basis of KLD data and find that these have a higher stock performance from 1992 to 2004, but that the abnormal returns are insignificant in the following years until 2009. As a consequence, all three discussed hypotheses about the relationship between SRI and stock performance are supported by some studies, at least if different time periods are considered. However, it should be noted that these former studies exclusively refer to the US stock market, whereas corresponding analyses for other stock markets are rare so far.

Our portfolio analysis is methodologically in line with these former studies, i.e. we also use raw corporate sustainability performance assessments. Furthermore, we also examine whether SRI stocks are mispriced so that they can have positive or negative abnormal returns. The main contribution of our study to the literature is two-fold: First, in contrast to the studies discussed above, we do not only consider the US stock market, but also analyze the entire European stock market. Second, our study is based on consistent world-wide corporate sustainability performance data from the Swiss bank ZKB (Zurich Cantonal Bank). This allows a comparative analysis for these two world-wide leading stock markets. The portfolio analysis is based on the common four-factor model according to Carhart (1997), which comprises market return, size, value, and momentum factors. These risk factors are necessary to estimate risk-adjusted returns that are more reliable than estimates from a restrictive one-factor model based on the CAPM.

We analyze different portfolios in this study: In a first step, we only examine firms that are included in the Morgan Stanley Capital International (MSCI) World Index. Based on the corporate sustainability performance assessments by ZKB, we construct US and European portfolios comprising firms that are sector leaders in terms of sustainability performance and corresponding portfolios comprising firms that are not sector leaders. These stock portfolios are then used to estimate average monthly risk-adjusted or abnormal returns. Furthermore, we consider a trading strategy of buying stocks of MSCI firms that are sector leaders in terms of sustainability performance and selling stocks of MSCI firms that are not sector leaders. In a second step, we additionally include firms from the US and European stock markets that are not part of the MSCI, but are identified as leaders in terms of sustainability performance by ZKB. We estimate again average monthly

risk-adjusted returns for the corresponding slightly more diversified portfolios.

The remainder of the paper is structured as follows: In section 2 we present our portfolio analysis approach and section 3 examines the data. Section 4 discusses the empirical results and the final section 5 concludes.

2 Methodological Approach

Our portfolio analysis compares the average stock performance of portfolios comprising firms that differ with respect to their sustainability performance. In line with recent studies (Bauer et al., 2007, 2005; Bebchuk et al., 2013; Derwall et al., 2005; Eccles et al., 2013; Edmans, 2011; Hong and Kacperczyk, 2009; Kempf and Osthoff, 2007; Ziegler et al., 2011), we examine risk-adjusted returns of different stock portfolios that are estimated on the basis of asset pricing models. So far, the traditional and most fundamental asset pricing model is the one-factor model based on the market model (Sharpe, 1963) and the CAPM (Fama and French, 2004; Lintner, 1965; Perold, 2004). On the basis of the "anomalies" discussion questioning the validity of the CAPM (Banz, 1981; DeBondt and Thaler, 1985; Fama and French, 1992), Fama and French (1993) have developed a three-factor model, which includes - in addition to the excess returns of the stock market as in the one-factor model - two factors with respect to size and value to explain the excess portfolio returns. Many empirical studies show that this three-factor model has more explanatory power than the one-factor model based on the CAPM, for example, Fama and French (1993, 1996) for the US, Berkowitz and Qiu (2001) for the Canadian, Hussain et al. (2002) for the British, and Schrimpf et al. (2007) or Ziegler et al. (2007) for the German stock market. With the emergence of this three-factor model the discussion about an additional factor, namely the momentum factor, began (Jegadeesh and Titman, 1993, 2001; Rouwenhorst, 1998) and resulted in the following four-factor model of Carhart (1997), which is currently the most common asset pricing model for general applications in financial economics (Bollen and Busse, 2005; L'Her et al., 2004) including SRI portfolio analyses:

$$r_{it} - r_{ft} \;=\; \alpha_i + \beta_{i1}(r_{mt} - r_{ft}) + \beta_{i2} SMB_t + \beta_{i3} HML_t + \beta_{i4} WML_t + \epsilon_{it}$$

In this model r_{it} and r_{mt} are the (continuous) stock returns of portfolio i and the market at the end of month t, r_{ft} is the risk-free interest rate at the beginning of month t, and ϵ_{it} is the disturbance term with expectation $E(\epsilon_{it}) = 0$ and (unknown) variance $Var(\epsilon_{it}) = \sigma_\epsilon^2$. The Fama-French size factor SMB_t is the difference between the returns of portfolios comprising stocks of "small" firms and portfolios comprising stocks of "big" firms at the end of month t. The Fama-French value factor HML_t is the difference between

the returns of portfolios comprising stocks of firms with a "high" book-to-market equity ratio and portfolios comprising stocks of firms with a "low" book-to-market equity ratio at the end of month t. Finally, the Carhart momentum factor WML_t is the difference between the returns of portfolios comprising stocks of recent "winners" and portfolios comprising stocks of recent "losers" at the end of month t. The unknown parameters are the four-factor alpha α_i as well as β_{i1}, β_{i2}, β_{i3}, and β_{i4} in addition to $Var(\epsilon_{it}) = \sigma_\epsilon^2$, which are estimated by ordinary least squares (OLS).

The parameter of principal interest is α_i and is interpreted as the average monthly risk-adjusted or abnormal return of stock portfolio i that is not explained by the four risk factors in the Carhart multifactor model. In the following, the alphas thus measure the stock return out- or underperformance of portfolios comprising firms that are or are not sector leaders in terms of sustainability performance compared with the stock market. Furthermore, we consider for the group of MSCI firms a trading strategy of buying stocks of firms that are sector leaders and selling stocks of firms that are not sector leaders in terms of sustainability performance. For this long-short strategy we examine returns of stock portfolios that are calculated by the difference between the returns of portfolios. The corresponding alphas can be calculated by the difference between the two separated alphas.

3 Data

3.1 Databases

In our study we use corporate sustainability performance data from ZKB, the biggest cantonal bank in Switzerland and one of the leading suppliers of SRI products on the Swiss financial market. ZKB employs a team of analysts with the mandate to identify firms that can be considered as sustainability leaders. These analysts are independent from the asset management unit at ZKB and their judgment of corporate sustainability performance is unaffected by financial considerations such as the past financial performance. Only after sustainability leaders have been identified, SRI portfolio managers are involved and take into account financial information. Compared with other suppliers of SRI products, the screening process of ZKB is rigorous since a positive screening is preceded by a broad negative screening process. The firms affected by the negative screening process are not assigned to the sustainability leaders group. Firm preclusion criteria in the negative screening process comprise main business operations centered around: Production of fossil energies, operation of energy plants based on fossil energies or nuclear energy, production of cars or planes, airlines, production of ozone depleting substances, production of harmful substances according to the Stockholm agreement, not sustainable fishery or forestry, production of nuclear reactors, operations related to genetically mod-

ified organisms, production of weapons or military machines, as well as production of tobacco and cigarettes.

During the assessment process the analyst team of ZKB consults firm documents such as annual reports and CSR reports as well as various environmental and social governance databases. The negative screening is followed by a consultation of important media to ensure that the firms are not involved in any problematic controversies as well as a best-in-class approach. The resulting assessment from this annual process is dichotomous and identifies firms leading their sector in terms of sustainability performance. Such firms are not said to have no improvement potential, but have a more in-depth approach to environmental, social, and corporate governance issues than their competitors. The assessments are made throughout the year and the first ratings started in 1997. In order to make sure that there is no look ahead bias, we group the firms at the end of each year and hold them in this group in the preceding year. Therefore, our portfolio analysis starts in 1998. It should be noted that ZKB - in line with other suppliers of SRI products - focuses on firms with higher market values (including all MSCI firms) compared with the entire stock market universes. This size difference has to be considered when the results of our portfolio analysis are interpreted. An analysis with a rather small group of small- to medium-sized firms based on an alternative assessment concept of ZKB can be found in Mollet et al. (2013).

Based on these corporate sustainability performance assessments, we consider three portfolios on the US and European stock markets. The portfolio 'sustainability leaders' comprises in each year firms that are general sector leaders in terms of sustainability performance. The portfolio 'MSCI sustainability leaders' comprises in each year the group of sustainability leaders among all MSCI firms over time, and the portfolio 'other MSCI firms' comprises in each year the group of MSCI firms that are not sustainability leaders. The portfolio 'MSCI sustainability leaders' is thus a sub-group of the portfolio 'sustainability leaders' since the latter comprises both the sector leaders in terms of sustainability performance among all firms in the MSCI as well as some sustainability leaders that are not part of the MSCI. Additionally, we also analyze long-short portfolios on the basis of a trading strategy of buying stocks of sustainability leaders in the MSCI and selling stocks of the other firms in the MSCI that are not sector leaders in terms of sustainability performance.

Our return data for the firms in the portfolio analysis stem from Thomson Reuters Datastream. The risk factors and the risk free interest rates for the European and US stock markets were downloaded from the website of Kenneth French (`http://mba.tuck.dartmouth.edu/pages/faculty/ken.french/data_library.html`). While the risk factors for the US stock market have been available for quite some time (Fama and French, 1992, 1993), the European risk factors have been provided only recently on this website (Fama and French, 2012). As a robustness check we also benchmark the US portfolios

against index-models as recommended by Cremers et al. (2012). Using data from Thomson Reuters Datastream we calculated the market return (S&P 500), a size factor (Russell 2000 minus S&P500), and a value factor (Russell 3000 minus Russell 3000 growth) and supplemented these factors with the risk-free interest rate and the WML factor from the database of Kenneth French. The corresponding estimation results are qualitatively nearly identical with the estimation results that are presented in this paper and are therefore not reported due to reasons of brevity. However, they are available upon request.

3.2 Descriptive Statistics

Table 1 reports the number of sample firms in the three portfolios 'sustainability leaders', 'MSCI sustainability leaders', and 'other MSCI firms' across industries according to the Industry Classification Benchmark (ICB) separately on the US and European stock markets. Table 2 shows the number of sample firms across the European countries as classified by Thomson Reuters Datastream according to the home or listing country of a stock. For reasons of brevity we report the cross-sectional distributions for the year 2008, the last year with full coverage, in these tables. In this year the US portfolios comprise 591 firms and the European portfolios comprise 575 firms. In the US most firms stem from the financial sector (110), followed by firms from the industrials sector (89). This pattern is similar for Europe with 129 industrial and 127 financial firms, although the order is narrowly reversed. With respect to the US sustainability leaders, the highest number of firms is from the technology sector. In contrast, the highest numbers of European sustainability leaders are in the industrials, financials, consumer services, and consumer goods sectors. Overall, the European stock market contains a substantially higher number of sustainability leaders than the US stock market in 2008.

Table 3 reports the numbers of sample firms and average market values from 1998 to 2009 for the three portfolios 'sustainability leaders', 'MSCI sustainability leaders', and 'other MSCI firms'. While the upper part of the table refers to the US, the lower part refers to the European stock market. The table shows that the number of European sustainability leaders is not only in 2008 but in each year higher than the number of US sustainability leaders. This result is not implying that European firms are more sustainable than US firms because this disparity could also be driven by a higher focus of ZKB on the European stock market. Table 3 also reports that the number of sustainability leaders strongly increases over time in both regions. Moreover, the table points to a further size tilt in the US: Not only the average size of the assessed firms is higher compared with the entire stock market universes, but also the average market values of sustainability leaders and particularly of MSCI sustainability leaders are in each year distinctly higher than the average market values of other MSCI firms that are not sustainability leaders. A similar but less pronounced size difference between sustainability leaders and MSCI firms

that are not sustainability leaders can be observed on the European stock market. But the size differences between the three portfolios 'sustainability leaders', 'MSCI sustainability leaders', and 'other MSCI firms' on the European stock market decrease over time, whereas they remain stable on the US stock market.

Table 4 reports average monthly returns for the full time period of our empirical analysis from 01/1998 to 04/2009 on the US (upper part) and European (lower part) stock markets. Additionally, the table reports the returns for the two sub-periods 01/1998-08/2003 and 09/2003-04/2009 with 68 months, respectively. The average monthly returns (in %) are reported for the entire stock markets, the risk-free interests, the SMB, HML, and WML factors as well as for the portfolios 'sustainability leaders', 'MSCI sustainability leaders', and 'other MSCI firms'. Since all our financial data are denominated in USD, the returns are also calculated on this basis. The average monthly risk-free interest rate amounts to 0.27% over the full time period for both regions. The average monthly returns on the stock market amount to 0.06% for the US and to -0.04% for Europe with different values for both sub-periods on the two stock markets. Out of the three risk factors, the WML factor delivers the highest average returns over the full time period on the US and European stock markets. Furthermore, this risk factor has positive average returns in both sub-periods, which is in line with the HML factor. In contrast, the average return of the SMB factor is slightly negative in Europe in the first sub-period.

The focal point in Table 4 are the average monthly stock returns for the three portfolios. While the returns across the full time period are positive for the MSCI firms that are not sustainability leaders, the corresponding average returns for the portfolios 'sustainability leaders' and 'MSCI sustainability leaders' are negative in both regions. The returns for all three portfolios decrease over time in the US so that they are negative in the second sub-period. While the average returns in Europe are also negative for the two portfolios 'sustainability leaders' and 'MSCI sustainability leaders' in the second sub-period, the portfolio 'other MSCI firms' has the highest positive average return in this sub-period in this region. However, the average monthly stock returns for the portfolio 'other MSCI firms' are in both sub-periods and in both regions more positive than the returns of the sustainability leaders. A naive interpretation of this result not taking heterogeneity into account would consider this as evidence for a negative relationship between SRI and stock performance. However, Table 3 already shows an important driver of heterogeneity, namely a size tilt of the sustainability leaders. By conducting a more reliable portfolio analysis as discussed in the second section, the results from the univariate descriptive statistics are scrutinized in the following.

4 Estimation Results

4.1 Aggregated Results

Table 5 reports the estimation results in Carhart four-factor models in the full time period from 01/1998 to 04/2009 for the portfolios 'sustainability leaders', 'MSCI sustainability leaders', 'other MSCI firms', as well as for the long-short portfolio as discussed above. The upper part of this table refers to the US stock market, while the lower part refers to the European stock market. In order to control for possible distortions due to heteroskedasticity or autocorrelation in the disturbance term, only the robust heteroskedasticity- and autocorrelation-consistent z-statistics according to Newey and West (1987) are reported besides the parameter estimates. In line with common practice (Greene, 2002), we assume a possibly autocorrelated error structure up to three lags.

The estimation results reveal for all three portfolios in Europe and for the portfolio 'other MSCI firms' in the US a significantly negative loading of the SMB factor. Furthermore, the WML factor has a significantly negative loading for all three portfolios in the US. In contrast, the parameters of the WML factor in Europe as well as all parameters of the HML factor are not significantly different from zero. However, the main result of Table 5 are the insignificant alphas for all portfolios in the US and for the portfolios 'sustainability leaders' and 'MSCI sustainability leaders' in Europe. This is generally in line with the third hypothesis as discussed in the introduction, i.e. our results do not support the notion that SRI stocks are mispriced or the notion that errors in expectations of investors are associated with corporate sustainability performance. In contrast, the portfolio 'other MSCI firms' has a significantly positive abnormal return in Europe, which leads to a significantly negative alpha in the long-short portfolio in this region.

4.2 Results for Different Time Periods and Sectors

However, it could be argued that these aggregated estimation results are not able to disclose possible additional abnormal returns in some sub-periods. In order to examine whether the estimation results differ over time (e.g. due to changing expectations, changing risk-premia, or learning processes of the market participants) or between several sectors, we consider disaggregated estimations. In a first step we examine different time periods and in a second step we exclude financial firms. Table 6 and Table 7 report the estimation results for the two sub-periods 01/1998-08/2003 and 09/2003-04/2009. While Table 6 refers to the corresponding estimation results on the US stock market, Table 7 refers to the corresponding results on the European stock market

Table 7 reveals that the significantly positive abnormal return for the European portfolio 'other MSCI firms' in the full time period from 01/1998 to 04/2009 according to Table 5 is strongly affected by the alpha estimate of 0.43 in the first sub-period. This

significant abnormal return becomes less significant in the second sub-period, although the estimated alpha is even higher. The corresponding alpha for the long-short portfolio is only weakly significantly negative in the second sub-period and insignificant in the first sub-period. In contrast, Table 6 shows that the abnormal returns for the US portfolio 'other MSCI firms' and the corresponding alphas for the long-short portfolio are insignificant in both sub-periods. Furthermore, in line with the aggregated estimation results in Table 5, we find neither on the US stock market (see Table 6) nor on the European stock market (see Table 7) significant abnormal returns in any sub-period for the portfolios 'sustainability leaders' and 'MSCI sustainability leaders'.

The estimation results are strongly confirmed when firms from the financial sector are excluded. The comparison between financial firms and firms from other sectors is generally of interest due to their strong differences in their valuation by the markets and their accounting rules (Eccles et al., 2013; Ziegler, 2012; Ziegler et al., 2011), which could influence the estimation results in our portfolio analysis. In addition, the separation of commercial and investment banking was suspended in 1999 in the US by the repeal of the Glass-Steagall Act and financial firms were strongly affected by the stock market turbulence during the observation period. Therefore, Table 8 (for the US stock market) and Table 9 (for the European stock market) report the corresponding estimation results in the four-factor model for the sub-group of non-financial firms and for both sub-periods besides the full time period.

Overall, the tables reveal qualitatively very similar estimation results as Table 6 and Table 7. Widely in line with Table 7, Table 9 reports for the European stock market a significantly positive abnormal return for the portfolio 'other MSCI firms' in both sub-periods. However, the estimated alphas for the long-short portfolio are now lower and less significant in the full time period, see also Table 5, and even insignificant in the second sub-period. The main result in Table 8 and Table 9 are again the insignificant alphas in all time periods for the portfolios 'sustainability leaders' and 'MSCI sustainability leaders' in Europe as well as in all time periods and for all portfolios in the US. Overall, these estimation results strengthen the view that SRI stocks are not mispriced and that possible errors in expectations of investors associated with corporate sustainability performance disappeared before our observation period, for example, through learning processes of the market participants.

5 Conclusion

This paper empirically analyzes the theoretically ambivalent relationship between SRI and stock performance. In contrast to former studies in this field, we do not only consider the US, but also the European stock market. The basis of our identification of SRI are consistent world-wide corporate sustainability performance data from ZKB. Methodolog-

ically, we examine in our portfolio analysis the risk-adjusted returns of different stock portfolios that are estimated on the basis of the common four-factor model according to Carhart (1997), which is less restrictive than the one-factor model based on the CAPM.

The main result of our paper are the insignificant abnormal returns for SRI on both the US and the European stock market. Therefore, our study supports the view that SRI stocks are correctly priced by market participants. However, we cannot rule out that a corresponding mispricing has existed before the beginning of our observation period in 1998. It can be speculated that learning processes by the market participants in the years before 1998 eliminated possible errors in expectations of investors associated with corporate sustainability performance. We only find some positive abnormal returns for firms in the MSCI that are not sector leaders in terms of sustainability performance. But these abnormal returns are only consistent on the European stock market. While this result in conjunction with the insignificant abnormal SRI returns could be disappointing for the appeal of SRI, our results do not suggest that this investment strategy has a systematic lower performance on either the US or the European stock market.

With respect to the investor perspective, our empirical analysis with corporate sustainability performance data from ZKB additionally reveals that SRI is often exposed to a size tilt. We show that even within the benchmark of highly capitalized firms sustainability leaders have a distinctly higher average market value than less sustainable firms. It should be noted that the identification of sustainability leaders by ZKB within a population of firms with high market values as basis for SRI is not an exemption. For example, the assessments for the construction of the Dow Jones Sustainability Index family are similarly based on large-sized firms (Ziegler and Schröder, 2010). These assessment processes therefore strengthen the relevance of the application of multifactor models for portfolio analyses of the relationship between SRI and stock performance.

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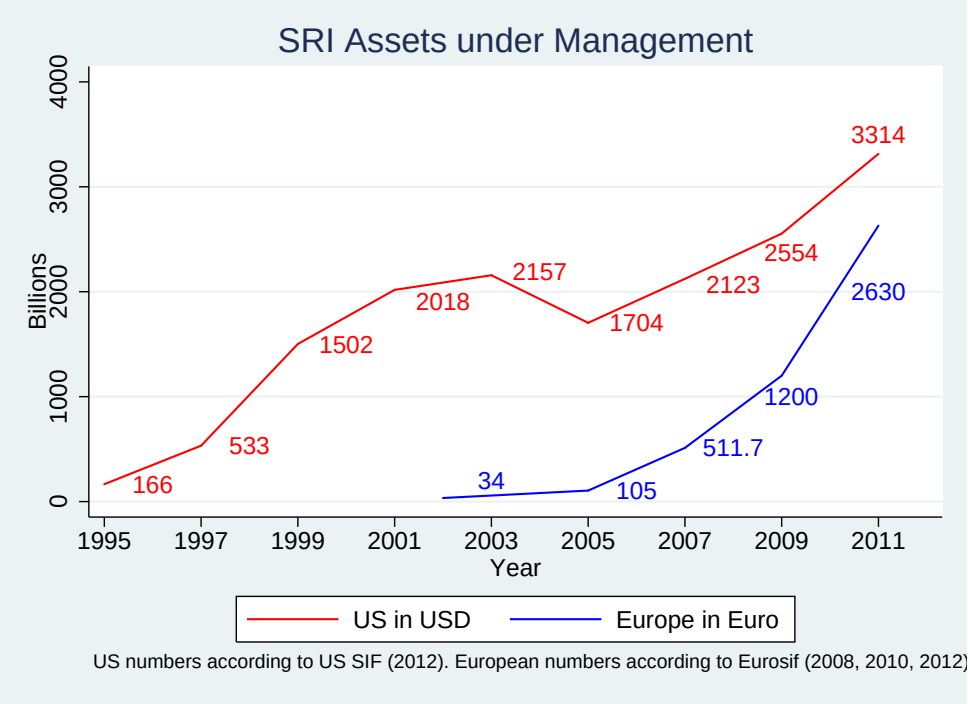

Figure 1: Volumes of SRI assets in the US and Europe over time

Table 1: Number of firms in portfolios across industries in 2008

	Sustainability leaders		MSCI sustainability leaders		Other MSCI firms	
Industry	US	Europe	US	Europe	US	Europe
Basic Material	3	5	3	5	23	35
Consumer Good	8	17	6	15	56	49
Consumer Service	6	19	5	18	77	62
Financial	3	25	3	17	107	102
Healthcare	7	7	7	6	53	21
Industrial	3	26	2	16	86	103
Oil & Gas	1	5	1	5	45	27
Technology	10	6	10	6	56	19
Telecommunication	1	4	1	3	10	14
Utility	-	6	-	4	36	23
Overall	42	120	38	95	549	455

Table 2: Number of European firms in portfolios across countries in 2008

Country	Sustainability leaders	MSCI sustainability leaders	Other MSCI firms
Austria	2	1	13
Belgium	3	3	18
Denmark	5	5	17
Finnland	6	5	17
France	8	7	62
Germany	14	10	36
Greece	-	-	15
Hungary	1	-	-
Ireland	1	-	10
Italy	3	1	32
Netherlands	4	4	18
Norway	3	3	17
Portugal	-	-	9
Spain	5	4	27
Sweden	11	11	30
Switzerland	20	9	26
United Kingdom	34	32	108
Overall	120	95	455

Table 3: Number of firms and average market value in portfolios over time

US

Year	Sustainability leaders		MSCI sustainability leaders		Other MSCI firms	
	Number of firms	Average market value*	Number of firms	Average market value*	Number of firms	Average market value*
1998	11	46.47	8	62.57	282	23.68
1999	16	59.18	9	98.29	286	29.43
2000	24	44.70	14	68.66	289	28.72
2001	25	43.71	14	71.30	252	28.22
2002	23	32.96	17	41.33	356	19.91
2003	26	41.19	20	50.04	348	22.96
2004	35	54.19	27	67.00	400	21.23
2005	42	53.85	37	59.26	447	20.78
2006	41	53.09	36	58.56	497	21.50
2007	42	53.02	37	58.24	501	21.96
2008	42	30.71	38	32.73	549	11.53
2009	37	32.46	33	32.39	449	13.44

Europe

Year	Sustainability leaders		MSCI sustainability leaders		Other MSCI firms	
	Number of firms	Average market value*	Number of firms	Average market value*	Number of firms	Average market value*
1998	29	24.95	24	27.03	367	9.10
1999	45	20.15	24	32.49	384	11.85
2000	56	17.25	29	27.07	389	12.28
2001	62	14.81	32	24.03	387	10.06
2002	64	11.09	38	17.86	435	8.59
2003	61	14.11	40	20.47	416	11.18
2004	71	16.83	54	21.27	416	14.31
2005	105	16.62	81	20.72	424	14.06
2006	113	21.66	89	26.40	434	16.76
2007	113	24.46	93	28.34	445	19.87
2008	120	9.61	95	11.16	455	9.80
2009	124	11.42	98	13.84	441	9.12

* In billion USD

Table 4: Average monthly returns (in %) for different time periods

	US							
Time period	r_{mt}	r_{ft}	SMB_t	HML_t	WML_t	Sustainability leaders	MSCI sustainability leaders	Other MSCI firms
1/1998-4/2009	0.06	0.27	0.20	0.19	0.69	−0.20	−0.23	0.11
1/1998-8/2003	0.18	0.32	0.30	0.22	0.88	−0.05	−0.05	0.27
9/2003-4/2009	−0.05	0.23	0.11	0.17	0.50	−0.35	−0.41	−0.05
	Europe							
Time period	r_{mt}	r_{ft}	SMB_t	HML_t	WML_t	Sustainability leaders	MSCI sustainability leaders	Other MSCI firms
1/1998-4/2009	−0.04	0.27	0.03	0.68	1.07	−0.23	−0.14	0.29
1/1998-8/2003	−0.17	0.32	−0.04	1.10	0.97	−0.30	−0.12	0.20
9/2003-4/2009	0.09	0.23	0.11	0.27	1.17	−0.15	−0.16	0.38

Table 5: Parameter estimates for the full time period (01/1998-04/2009)

	US					
Portfolios	Alpha	$r_{mt} - r_{it}$	SMB_t	HML_t	WML_t	R^2
Sustainability leaders	−0.07 (−0.29)	0.87 ∗ ∗ (11.65)	−0.10 (−1.04)	−0.10 (−1.03)	−0.14 ∗ ∗ (−2.46)	0.68
MSCI sustainability leaders	−0.09 (−0.35)	0.90 ∗ ∗ (11.03)	−0.12 (−1.25)	−0.08 (−0.72)	−0.13 ∗ ∗ (−2.34)	0.67
Other MSCI firms	0.14 (1.16)	0.94 ∗ ∗ (19.21)	−0.12 ∗ ∗ (−2.19)	0.04 (0.62)	−0.08 ∗ ∗ (−2.19)	0.83
Long-short: MSCI firms	−0.23 (−0.90)	−0.04 (−0.73)	0.00 (0.02)	−0.12 (−1.50)	−0.06 (−0.97)	−0.00
	Europe					
Portfolios	Alpha	$r_{mt} - r_{it}$	SMB_t	HML_t	WML_t	R^2
Sustainability leaders	−0.03 (−0.18)	1.03 ∗ ∗ (18.97)	−0.41 ∗ ∗ (−5.52)	0.02 (0.21)	−0.06 (−1.38)	0.82
MSCI sustainability leaders	0.03 (0.18)	1.03 ∗ ∗ (18.91)	−0.40 ∗ ∗ (−5.01)	0.01 (0.08)	−0.04 (−0.79)	0.82
Other MSCI firms	0.38 ∗ ∗ (2.95)	1.04 ∗ ∗ (27.00)	−0.27 ∗ ∗ (−4.48)	0.02 (0.26)	−0.00 (−0.11)	0.89
Long-short: MSCI firms	−0.35 ∗ ∗ (−2.19)	−0.02 (−0.47)	−0.13 ∗ ∗ (−1.98)	−0.01 (−0.10)	−0.04 (−0.77)	0.01

* (**, ***) means that the appropriate parameter is different from zero at the 10% (5%, 1%) significance level, respectively. Values in () are the robust z-statistics.

Table 6: Parameter estimates for the US stock market for two sub-periods periods

Portfolios	Time period	Alpha	$r_{mt} - r_{it}$	SMB_t	HML_t	WML_t	R^2
Sustainability leaders	01/1998-08/2003	0.11	$0.77 * **$	$-0.24 * *$	$-0.32 * **$	-0.08	0.69
		(0.27)	(9.23)	(−2.35)	(−3.63)	(−1.37)	
	09/2003-04/2009	−0.13	$0.75 * **$	0.19	0.16	$-0.42 * **$	0.74
		(−0.59)	(6.59)	(0.97)	(1.16)	(−3.39)	
MSCI sustainability leaders	01/1998-08/2003	0.13	$0.78 * **$	$-0.27 * **$	$-0.32 * **$	-0.08	0.68
		(0.29)	(9.03)	(−2.76)	(−3.44)	(−1.30)	
	09/2003-04/2009	−0.18	$0.78 * **$	0.17	0.23	$-0.43 * **$	0.74
		(−0.78)	(6.35)	(0.86)	(1.57)	(−3.37)	
Other MSCI firms	01/1998-08/2003	0.27	$0.83 * **$	$-0.21 * **$	$-0.11*$	$-0.06 * *$	0.86
		(1.58)	(17.19)	(−4.77)	(−1.89)	(−2.06)	
	09/2003-04/2009	0.13	$0.95 * **$	0.07	0.07	$-0.22*$	0.83
		(0.66)	(16.66)	(0.37)	(0.95)	(−1.70)	
Long-short: MSCI firms	01/1998-08/2003	−0.14	−0.05	−0.06	$-0.21 * *$	−0.02	−0.01
		(−0.31)	(−0.62)	(−0.54)	(−2.06)	(−0.27)	
	09/2003-04/2009	−0.31	−0.18	0.10	0.15	$-0.20 * *$	0.15
		(−1.49)	(−1.61)	(0.62)	(1.04)	(−2.28)	

* (**, ***) means that the appropriate parameter is different from zero at the 10% (5%, 1%) significance level, respectively.

Values in () are the robust z-statistics.

Table 7: Parameter estimates for the European stock market for two sub-periods

Portfolios	Time period	Alpha	$r_{mt} - r_{it}$	SMB_t	HML_t	WML_t	R^2
Sustainability leaders	01/1998-08/2003	0.08	$0.93 * **$	$-0.52 * **$	$-0.13*$	−0.02	0.78
		(0.36)	(17.79)	(−6.40)	(−1.67)	(−0.40)	
	09/2003-04/2009	0.08	$0.92 * **$	$-0.23*$	$0.84 * **$	$-0.38 * **$	0.92
		(0.30)	(15.76)	(−1.77)	(3.44)	(−5.80)	
MSCI sustainability leaders	01/1998-08/2003	0.24	$0.94 * **$	$-0.51 * **$	−0.14	0.02	0.78
		(1.01)	(18.22)	(−5.96)	(−1.55)	(0.32)	
	09/2003-04/2009	0.09	$0.90 * **$	−0.22	$0.84 * **$	$-0.40 * **$	0.91
		(0.35)	(14.58)	(−1.66)	(3.11)	(−6.00)	
Other MSCI firms	01/1998-08/2003	$0.43 * **$	$1.01 * **$	$-0.26 * **$	$-0.06*$	0.04	0.89
		(2.95)	(33.48)	(−4.05)	(−1.72)	(1.20)	
	09/2003-04/2009	0.50*	$0.95 * **$	$-0.29 * *$	$0.63 * **$	$-0.25*$	0.92
		(1.71)	(26.38)	(−2.54)	(2.66)	(−1.87)	
Long-short: MSCI firms	01/1998-08/2003	−0.20	−0.07	$-0.25 * **$	−0.07	−0.02	0.02
		(−0.80)	(−1.51)	(−3.22)	(−0.95)	(−0.40)	
	09/2003-04/2009	−0.41*	−0.05	0.07	0.21	−0.15	0.04
		(−1.74)	(−0.89)	(0.81)	(1.02)	(−1.33)	

* (**, ***) means that the appropriate parameter is different from zero at the 10% (5%, 1%) significance level, respectively.

Values in () are the robust z-statistic.

Table 8: Parameter estimates for the US stock market without financial firms for different time periods

Portfolios	Time period	Alpha	$r_{mt} - r_{it}$	SMB_t	HML_t	WML_t	R^2
Sustainability leaders	01/1998-04/2009	0.07	$0.81 * **$	-0.12	$-0.24 * **$	$-0.11 * *$	0.66
		(0.27)	(10.20)	(-1.17)	(-2.78)	(-2.14)	
	01/1998-08/2003	0.12	$0.71 * **$	$-0.24*$	$-0.42 * **$	-0.10	0.65
		(0.27)	(6.88)	(-1.98)	(-3.95)	(-1.67)	
	09/2003-04/2009	0.09	$0.75 * **$	0.21	-0.10	$-0.23*$	0.70
		(0.41)	(6.69)	(1.11)	(-0.87)	(-1.93)	
MSCI sustainability leaders	01/1998-04/2009	0.05	$0.84 * **$	-0.15	$-0.23 * *$	$-0.11*$	0.65
		(0.18)	(9.87)	(-1.42)	(-2.32)	(-1.97)	
	01/1998-08/2003	0.14	$0.73 * **$	$-0.28 * *$	$-0.43 * **$	-0.09	0.65
		(0.29)	(6.86)	(-2.31)	(-3.76)	(-1.59)	
	09/2003-04/2009	0.04	$0.78 * **$	0.19	-0.05	$-0.22*$	0.70
		(0.18)	(6.46)	(1.00)	(-0.35)	(-1.82)	
Other MSCI firms	01/1998-04/2009	$0.20*$	$0.91 * **$	$-0.11 * *$	-0.07	$-0.07*$	0.83
		(1.73)	(17.60)	(-2.29)	(-1.12)	(-1.91)	
	01/1998-08/2003	0.28	$0.79 * **$	$-0.19 * **$	$-0.21 * **$	$-0.07 * *$	0.85
		(1.35)	(12.45)	(-3.88)	(-3.02)	(-2.25)	
	09/2003-04/2009	0.24	$0.96 * **$	0.04	-0.06	-0.13	0.83
		(1.34)	(16.79)	(0.23)	(-0.66)	(-1.04)	
Long-short: MSCI firms	01/1998-04/2009	-0.15	-0.07	-0.03	$-0.16 * *$	-0.04	0.01
		(-0.59)	(-1.05)	(-0.32)	(-2.02)	(-0.69)	
	01/1998-08/2003	-0.14	-0.06	-0.09	$-0.22*$	-0.03	-0.02
		(-0.29)	(-0.68)	(-0.67)	(-1.81)	(-0.40)	
	09/2003-04/2009	-0.20	$-0.19*$	0.16	0.01	-0.08	0.07
		(-0.92)	(-1.72)	(0.90)	(0.06)	(-0.88)	

* (**, ***) means that the appropriate parameter is different from zero at the 10% (5%, 1%) significance level, respectively.

Values in () are the robust z-statistics.

Table 9: Parameter estimates for the European stock market without financial firms for different time periods

Portfolios	Time period	Alpha	$r_{mt} - r_{it}$	SMB_t	HML_t	WML_t	R^2
Sustainability leaders	01/1998-04/2009	0.16	$0.90 * **$	$-0.42 * **$	$-0.29 * **$	0.03	0.72
		(0.83)	(13.01)	(-4.43)	(-2.89)	(0.50)	
	01/1998-08/2003	0.27	$0.69 * **$	$-0.61 * **$	$-0.50 * **$	0.05	0.66
		(0.95)	(9.33)	(-5.55)	(-5.26)	(0.76)	
	09/2003-04/2009	0.36	$0.89 * **$	$-0.28*$	0.35	$-0.27 * **$	0.88
		(1.33)	(18.10)	(-1.82)	(1.55)	(-3.80)	
MSCI sustainability leaders	01/1998-04/2009	0.23	$0.91 * **$	$-0.38 * **$	$-0.34 * **$	0.07	0.71
		(1.24)	(12.91)	(-3.76)	(-2.75)	(1.02)	
	01/1998-08/2003	$0.43*$	$0.72 * **$	$-0.53 * **$	$-0.55 * **$	0.10	0.65
		(1.78)	(9.82)	(-4.50)	(-5.33)	(1.40)	
	09/2003-04/2009	0.38	$0.87 * **$	$-0.29*$	0.36	$-0.27 * **$	0.87
		(1.38)	(16.51)	(-1.79)	(1.50)	(-3.58)	
Other MSCI firms	01/1998-04/2009	$0.50 * **$	$0.97 * **$	$-0.22 * **$	$-0.14 * *$	0.02	0.86
		(3.69)	(24.06)	(-3.38)	(-2.05)	(0.50)	
	01/1998-08/2003	$0.54 * **$	$0.90 * **$	$-0.23 * **$	$-0.23 * **$	0.04	0.86
		(3.16)	(24.79)	(-3.16)	(-4.22)	(0.89)	
	09/2003-04/2009	$0.61 * *$	$0.94 * **$	$-0.27 * *$	0.27	-0.13	0.89
		(2.22)	(24.70)	(-2.11)	(1.05)	(-1.01)	
Long-short: MSCI firms	01/1998-04/2009	$-0.27*$	-0.07	$-0.16 * *$	$-0.20 * *$	0.05	0.06
		(-1.67)	(-1.46)	(-2.18)	(-2.29)	(0.83)	
	01/1998-08/2003	-0.10	$-0.18 * **$	$-0.29 * **$	$-0.32 * **$	0.06	0.12
		(-0.41)	(-2.82)	(-3.30)	(-3.68)	(0.96)	
	09/2003-04/2009	-0.23	-0.07	-0.01	0.09	-0.14	0.03
		(-1.03)	(-1.26)	(-0.18)	(0.50)	(-1.55)	

* (**, ***) means that the appropriate parameter is different from zero at the 10% (5%, 1%) significance level, respectively.

Values in () are the robust z-statistics.